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DR. KING'S LETTER

TO THE

LORD BISHOP OF DURHAM.

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L E T T E R

T O

THE RIGHT REVEREND
THE LORD BISHOP OF DURHAM.

CONTAINING
SOME OBSERVATIONS
ON THE
CLIMATE OF RUSSIA,
AND THE
NORTHERN COUNTRIES.

WITH
A VIEW OF THE FLYING MOUNTAINS AT
ZARSKO SELLO NEAR ST. PETERSBOURG.

FROM
JOHN GLEN KING, D.D. F.R.S. and A.S.

L O N D O N :

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The Flying Mountains at Łazienki Park.

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THE RIGHT REVEREND

THE LORD BISHOP OF DURHAM, &c.

MY LORD,

I TAKE the liberty to send your Lordship a few remarks I made, during my residence in Russia, on the cold in that country ; particularly, with respect to the means by which the inhabitants of those northern climates are enabled not only to protect themselves from suffering by its inclemency ; but to turn it to their advantage, and even to enjoy amusements peculiar to it. Which will justify

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the observation of our excellent philosophical poet,
who says,

“ What happier natures shrink at with affright,
“ The hard inhabitant contends is right.”

ESSAY ON MAN.

If I could have communicated any experiments which might have helped to discover the natural cause of *freezing*, and have served either to confirm some of the several theories already given of this phenomenon, or to establish a new one; I should have thought my remarks more worthy your Lordship's attention, and have long since put the loose notes, which have lain by me, on this subject, into some form. But though I made many experiments in freezing several substances, I cannot pretend to have found any thing new or singular to remark as to the nature of congelation. Yet still, I hope it may afford your Lordship some amusement to observe the sagacity and address, which the human mind exerts, in the application of the proper means of self-preservation: and the consideration of the wonderful provision which the wisdom and goodness of Divine Providence has suited to the

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the peculiar wants of his creatures, I am sure, your Lordship will always look upon as the most interesting part of natural history.

It is necessary for me to premise, that in the course of these observations I may be obliged to repeat several things which have been said before ; but, I flatter myself, I may be able to set some of them in a new light, and to add others which have been overlooked or omitted.

I must first observe to your Lordship, that the cold in St. Petersburg, by Farenheit's scale, is, during the months of December, January, and February, usually from 8 to 15 or 20 degrees below 0 ; that is, from 40 to 52 degrees below freezing point : though commonly, in the course of the winter, it is for a week or ten days some degrees lower.

It is almost difficult for an inhabitant of our temperate climate to have any idea of a cold so great ; it may, perhaps, help to give some notion of it, to tell you that when a person walks out in that severe weather, the cold makes the eyes water,
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and that water freezing hangs in little icicles on the eye-lashes. As the common peasants usually wear their beards, you may see them hanging at the chin like a solid lump of ice. Yet, by the way, the advantage of the beard, even in that state, to protect the glands of the throat, is worth observation: and the soldiers, who do not wear their beards, are obliged to tie a handkerchief under the chin to supply their place. From this account, it may easily be imagined, that the parts of the face, which are exposed, are very liable to be frozen; and it may seem strange, what is a certain fact, and has been often observed, that the party himself does not know when the freezing begins; but is commonly told of it first by somebody who meets him, and calls out to him to rub his face with snow, the usual way to thaw it. It is also remarkable that the part, which has once been frozen, is ever after most liable to be frozen again.

In some very severe winters, I have seen sparrows, though a hardy bird, quite numbed by the intense cold, and unable to fly. And I have heard that the drivers, who sit on their loaded carriages, have sometimes been found frozen to death in that posture.

posture. The seasons however are seldom so severe, and that severity lasts but a few days; though it is not unfrequent, in the course of a winter, that some poor wretches, getting drunk with spirituous liquors, fall down by the road-side, and perish by the cold before any one finds them. I dare say, your Lordship begins to shiver at this relation; but I will soon carry you into one of the houses of the country, where I will promise you, you will find it sufficiently warm: yet I will first beg leave to mention a few experiments with regard to freezing substances, some of which I made myself, and others I have had well authenticated.

When the thermometer has stood at 25 degrees below 0, boiling water thrown up into the air by an engine, so as to spread, falls down perfectly dry, formed into ice. I have made an experiment nearly like this, by throwing the water out of a window two pair of stairs high. A pint bottle of common water, I have found frozen into a solid piece of ice in an hour and a quarter. During the operation, I have observed the *spicula* flying towards the exterior part of the water, full an inch, or an

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inch and half long, where they form the chrysalization; the great length of these spicula is remarkable, and seems to be caused by the intenseness of the cold. A bottle of strong ale has been frozen in an hour and half; but in this substance there is always about a tea-cup full in the middle unfrozen, which is as strong and inflammable as brandy or spirits of wine. I never saw good brandy or rum freeze to solid ice, though I have seen ice very thin in both, when put in a small flat phial: the phials, I made use of for the experiment, were the common bottles in which there had been lavender water.

It may not be foreign to these instances to mention an experiment made by Prince Orloff, master of the Ordnance to her imperial Majesty, which I had from him, though I was not a witness of it myself. He filled a bomb-shell with water, and then stopped up the hole very closely with a plug; and, as soon as the congelation began, the contents of the shell swelling issued out by the side of the plug, like a small *jet d'eau*, or fountain. He then made a screw to fasten up the hole of the bomb-shell, after it was filled with water; and in twenty minutes the
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frost burft the fhell with fome degree of violence, fo that fome of the pieces flew to the diftance of four or five yards.

Severe, however, as the cold in this climate is, it is feldom any body fuffers from it, fo eafy are the means and fo plentiful are the provifions to guard againft it; befides the inconveniences of the excefs of cold are much lefs than thofe of the oppofite extreme, in countries fubject to an excefs of heat. Indeed, juft in St. Petersbourg, the poor fometimes fuffer; as in all capitals the hardfhips of the poor are greateft; but, for others, they are fo well protected, both without doors and within, that you feldom hear them complain of cold. It is well known that in Ruffia the method of warming the houfes is by an oven conftituted with feveral flues, and that the country abounds with wood, which is the common fuel; however, thefe ovens confume a much fmaller quantity of wood than could be imagined, and yet they ferve at the fame time for the ordinary people to prepare their food by. They put a very moderate faggot into them, and fuffer it to burn only till the thickeft black
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smoak is evaporated; they then shut down the chimney to retain all the rest of the heat in the chamber, which keeps its heat twenty-four hours, and is commonly so warm that they sit with very little covering, especially children, who are usually in their shirts.

The windows in these huts are very small, as it is obvious that part must be liable to be coldest; in the houses of persons of condition the windows are caulked up against winter, and commonly have double glass frames. In short, they can regulate the warmth in their apartments by a thermometer with great exactness, opening or shutting the flues to increase or diminish the heat. In the severest weather a Russian would think it strange to sit in a room where the cold condensed his breath sufficiently to render it visible, as it commonly does in England in frosty weather; and surely it is agreeable to have the warmth equal in every part of the room. It might perhaps be thought that the air, in apartments so close, must needs be very unfit for respiration; but the fact is full against the conjecture; for Petersburg is reckoned

reckoned as wholesome a place as any city in Europe; probably, the natural elasticity of the air is so great, in all those high latitudes, that it is not easily destroyed.

Thus the inhabitants suffer no hardships from the cold within doors; I will venture to assert not so much as the inhabitants of England, where the duration of severe cold is so short, that it is hardly an object of attention to guard against it, either in their dwellings or their apparel. Whereas the Russians, when they go out, are clothed so warmly they bid defiance to frost and snow; and it is observable, that the wind is never violent in the winter, and in general there is very little wind: but when it does happen to blow the cold is exceedingly piercing. The animals naturally require warm cloathing in these severe climates, man is therefore enabled readily to supply himself with covering from them: the wolf and the bear lend him their fur, as well as several other creatures; the fox, the squirrel, and the ermine: but none contribute so much to supply this want as the hare and the sheep. With regard to the hare one must not omit to remark, that the better to conceal so timorous and weak an animal

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from its enemies, Providence has wisely ordered that in countries like these, which are covered with snow, the fur of this creature changes in the winter to white; it being in summer brown, the natural colour of the ground: and its fur is much longer, and consequently warmer than in more southern latitudes. The poorer women commonly line their cloaks with hare-skin; and the men for the most part have a dress made of sheep's skin with the wool turned inwards. On their heads they wear a warm fur cap, and they are very careful to cover their legs and feet not only with warm stockings, but with boots lined with fur, or a quantity of flannel which they wrap several times round them. Yet, in the severest cold, you will see them go with their neck and breast quite open and exposed. This seems a kind of natural instinct, the parts nearest the heart, where the blood receives its first impulse, being perhaps less liable to be injured by cold than the extremities of the body. Or does such practice depend intirely upon custom? For we see in our own country that custom will do a great deal; at the same time that the men with us guard their breast with the warmest part of their dress, the most delicate lady exposes her bosom quite

quite uncovered ; as well as her whole person in a garment so thin, that few men would think sufficiently warm even in the mildest weather.

It must be confessed, the winters seem very long and tedious in these northern climates, the whole surface of the ground being covered with snow for six months or upwards ; and the eye is, at least my eye was, tired with the unvaried scene, *where Nature herself seems dead for half the year*. However, use makes even this much more tolerable to the natives, as well as their happy ignorance of better climes : and it is certain they enjoy many advantages which are peculiar to the nature of their situation.

The first advantage I shall mention is the facility of transport, and in consequence expedition in travelling. Their carriages for the winter season, it is well known, are sledges, made with a frame at the bottom shod with iron like skates. The friction and resistance are so small on the ice and hard frozen snow, that when one pulls one of these machines, with a considerable load on it, on
level

level ground, we seem surprized to find we can move it, with almost as much ease as we move a boat in still water. The consequence of this is a ready and cheap communication from one place to another; for a single horse will draw a great load in proportion to his strength, and in parts distant from the capital, they do not keep any road with the sledges, but make their way indifferently over rivers and bogs, and sometimes I am told they travel by a compass. It may not perhaps be unworthy observation to remark that the roads over the rivers near Petersbourg are set out by large boughs of fir trees planted on each side, forming an avenue; for the tracts of the carriages are very slight, and those soon covered by drifted snow or a fresh fall. Near the capital, where the traffick is naturally the greatest, the roads are kept in repair in winter with the same attention as in summer; when a thaw happens to injure them they are mended with fresh ice laid in the holes and covered with snow, and water thrown upon it to freeze again. Such precautions are necessary as these roads serve half the year: if the ice on the river be cracked, by a swell in the water, a bridge of planks is laid over it. It may be added that the strong northern light and the reflection

flexion of the snow, generally afford a light sufficient to travel by, when there is no moon.

It is obvious to imagine that with such means wealth and luxury would find out very commodious methods of travelling. The late Empress Elizabeth had a sledge, which I have seen, made with two complete little rooms in it, in one of which was a bed. I can believe the motion in such a vehicle not to be greater than in a ship, when the sea is tolerably smooth. The common travelling equipage, for persons of condition, is made large enough to lie at length in, and when the bed or matrafs is rolled up it makes a seat to sit upon. I need not take notice of the great expedition with which people travel, as it is so notorious ; I mean with horses, for I am unacquainted with those parts where rein-deer are used. The accommodations on the road are, indeed, very poor ; but travellers want them but little, as they usually take their provisions with them, and travel by night as well as by day.

Another advantage peculiar to the northern climates, is the preserving provisions by the frost.

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Frost may certainly be looked up as the best pickle while it serves ; that is, it alters the quality and taste of whatever is preserved by it less than any other. It is evident, the three common preserves, sugar, vinegar, and salt impart their respective tastes so strongly, that very few things so preserved retain the least of their natural flavour. Whereas frost seems only to fix the parts and juices, and by that means to prevent fermentation. I shall mention a fact, in proof of this, which I had from my late worthy friend Mr. Swallowe, his Majesty's Consul General in Russia. He assured me that having, one winter, occasion to go from Peterfbourg to Moscow, where eels are a great rarity, he ordered some to be taken before he sat out on his journey to carry as a present ; as soon as they were taken out of the water, they were thrown upon the ground to be frozen, they appeared quite dead and almost a piece of ice ; they were then packed up in the usual manner with snow ; and when he arrived at Moscow, which was in four days, the eels being thrown into cold water, and so thawed before they were dressed, discovered evident marks of life in them, and soon perfectly recovered. The inference

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I would draw from this fact is, that freezing does not dilacerate the parts. Veal frozen at Archangel and brought to Petersbourg is esteemed the finest they have ; nor can it be distinguished at the table from what is fresh killed, being equally juicy.

The markets in the capital are by this means supplied in winter with all manner of provisions, at a cheaper rate than would otherwise be possible : and it is not one of the least curious things to see the vast stacks of whole hogs, sheep, fish, and other animals, piled up in the markets for sale. Good housewives, as soon as the frost sets in for the winter, about the end of October, kill their poultry, and keep them in tubs packed up with a layer of snow between them, as one would put salt to pickle pork or beef, and then take them out for use as occasion requires : by this means they save the nourishment of the animal several months.

I hinted that the method of thawing any thing must be by immersing it in cold water : that operation effected by heat seems to occasion a violent fermentation,

mentation, and almost a sudden putrefaction : but when produced by cold water, the ice seems to be attracted out of the body, and forms a transparent incrustation round it. This I have constantly seen round grapes, when thawed, which looked as if set in glass. Nay, I have thawed a bottle of water, when frozen to a solid piece of ice, by this means without breaking the bottle, and the ice has formed an incrustation round it, in the manner I describe. The same thing may be observed if a cabbage which is thoroughly frozen be thawed by cold water, it is as fresh as if just gathered out of the garden ; but if it be thawed by fire or hot water, it becomes so rancid and strong it cannot be eaten.

These, my Lord, are solid advantages derived from the nature of the coldest climates. It might appear trifling after them to mention others of a less serious kind, and yet some of their amusements are also peculiar to the climate. One of the chief is that of riding in a light open sledge for pleasure, which is very common, because very agreeable when the weather is not too severe. Skating may be mentioned as another ; but the weather is often too severe

severe for that, and therefore it is by no means so general in Russia as in milder climates, such as Holland, Germany, &c. But of all the winter diversions of the Russians the most favourite, and which is peculiar to them, seems to be that of sliding down a hill. They make a track on the side of a steep hill, mending any little inequalities with snow or ice, then at the verge of the hill, sitting on a little seat not bigger than, and much resembling, a butcher's tray, they descend with astonishing velocity. The sensation is indeed very odd, but to myself, for I have often had the curiosity to try it, I cannot say it was agreeable ; the motion is so rapid it takes away one's breath : nor can I give an idea of it, except desiring you to fancy you were to fall from the top of a house without hurting yourself, in which you would probably have some mixture of fear and surprize. The Russians are so fond of this diversion, that at Petersburg, having no hills, they raise artificial mounts on the ice on the river Neva for the purpose of sliding down them, particularly on holidays and festival seasons, when all the people, young and old, rich and poor partake of the sport ; paying a trifle to the persons who constructed the mount, each time they descend.

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I call this peculiar to Russia as a diversion: for though it is practised at the place known by the name of the *Ramasse*; the descent of Mount Cenis to Lanebourg, which at some seasons of the year is in a state that admits of travellers sliding down it in the same method, as is described in most books that treat of the Alps, yet this may be considered rather as necessity or convenience than merely amusement.

The late Empress Elizabeth was so fond of this diversion that, at her palace of ZARSKO SELLO, she had artificial mounts, of a very singular construction, made for this purpose, of which I here give your Lordship a plate. These have been called, by some Englishmen who have visited that country, *The Flying Mountains*, and I do not know a phrase which approaches nearer to the Russian name. You will observe that there are five mounts of unequal heights: the first and highest is full thirty feet perpendicular altitude; the momentum with which they descend this carries them over the second, which is about five or six feet lower, just sufficient to allow for the friction and resistance;
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and so on to the last, from which they are conveyed by a gentle descent, with nearly the same velocity, over a piece of water into a little island. These slides, which are about a furlong and half in length, are made of wood, that they may be used in summer as well as in winter. The process is, two or four persons sit in a little carriage and one stands behind, for the more there are in it the greater the swiftness with which it goes ; it runs on castors, and in grooves to keep it in its right direction, and it descends with a wonderful rapidity. Under the hill, is a machine worked by horses for drawing the carriages back again, with the company in them. Such a work as this would have been enormous in most countries for the labour and expence it cost, as well as the vast quantity of wood used in it. At the same place, there is another artificial mount which goes in a spiral line, and in my opinion, for I have tried it also, is very disagreeable ; as it seems always leaning on one side, and the person feels in danger of falling out of his seat.

In winter no work can be done in agriculture, as may easily be imagined, the ground being fast-
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ened by the frost as well as covered by snow. The œconomical business, therefore, which constitutes the employment of the common people in this season, is, besides the threshing the corn, manufacturing their cloaths, for the peasants in the villages make their own wearing apparel of every sort, felling timber for building or other purposes, and cutting wood for firing.

They are able also to go out a hunting, and as the country abounds with game it furnishes a large part of their provisions, during the seasons when they are permitted to eat it; for the fasts of the Greek church taken together interdict animal food full half the year. The method the common people use in hunting is with snow shoes, which are nothing more than a piece of wood half an inch thick, five or six feet long, and about four inches broad, turned up at the end, which they fasten at the bottom of their feet, and by means of them they run or rather skate over the snow, with a pole in their hands, faster than the hare or any game they pursue, which are apt to sink in.

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They enjoy also the the profitable diversion of fishing, notwithstanding the water's being covered with ice ; and one manner of it, with a drag-net, is very particular, though I doubt if I shall be able to describe it so as to give your Lordship an idea of it. There is a hole about four feet by two cut in the ice, to let down a common drag-net ; opposite to this, at the distance they mean to pull up the net, is another hole, about four feet square : they then cut a number of small round holes at about four yards distance from each in a circular form, from the hole, where the net is let down, to that where it is taken up. At the ends of the two strings, that is the upper and lower strings which drag the net, long poles are tied : these poles will reach from one round hole to another, where they are directed and pushed under the ice, as they swim at the top of the water, till they come to the biggest square hole, at which they draw them out, and by this means the net, inclosing the fish it has surrounded ; for the upper part of the net is floated at the top of the water under the ice, and the lower part of it sunk by leads, in the same manner as when the river is open : the ingenuity of the operation

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tion consists in the contrivance of dragging under the ice.

These, my Lord, are some of the peculiarities of the northern climates in winter ; they have their inconveniencies, but they have their advantages too. In summer they differ much less from southern climates. To balance the long absence of the sun in the former season, they enjoy a larger share of his influence in the latter ; which causes vegetation to be exceedingly quick ; otherwise the shortness of the season would not suffice for the necessary business of sowing the land, for the growth of the corn, and for gathering it in.

Some persons reckon the light nights in summer an agreeable circumstance, and these are very remarkable even in the latitude of St. Petersburg, which is 61 degrees : this arises not only from the sun's being so short a time under the horizon, but from the strong reflection of the atmosphere, which causes so great a brightness one may see to read and write at midnight, unless it be cloudy, for full two months.

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I have now finished this account which has nothing of fancy in it to enliven it: it contains merely matters of fact, which could not escape my observation during a residence of eleven years in that country. Indeed, Russia is a country so rising and flourishing under the auspices of the Sovereign who now reigns there, and encourages, in the most distinguished manner, every endeavour to improve and exalt it, by patronizing all liberal arts and sciences, that it must attract the attention and admiration of mankind in many most important points of view. Yet still I flatter myself this short relation of the peculiar qualities of its climate may afford some reflections not unworthy a philosophical mind: I therefore presume to present it to your Lordship, and shall esteem myself very happy if it affords you any entertainment.

I have the honour to be, with the greatest respect,

My Lord,

Your Lordship's most obliged,

most faithful, and most obedient

humble servant,

Blackheath,
January 22, 1778.

JOHN GLEN KING.

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